REMARKS

The Office Action issued May 9, 2001 has been reviewed and the comments of the U.S. Patent and Trademark Office have been considered. Claims 6-9 have been canceled. Claims 1, 3, 10, 16, 19 and 20 have been amended. No new matter has been added. Accordingly, Applicants request reconsideration of the pending claims 1-5 and 10-23.

Claims 10-15 have been indicated by the Examiner as being allowable if rewritten in independent form. Applicants have rewritten claim 10 as suggested by the Examiner. Applicants have also amended claims 16 and 19 to depend from claim 10. Accordingly, claims 10-19 are in condition for allowance.

The drawings have been objected to for failing to show the "at least one slot extending tangentially from the at least one fuel passage opening to the central aperture" recited in claim 10. Applicants respectfully note that the second full paragraph of page 5 of the specification recites the following: "*The swirl disk 88 has a plurality of slots 100 that corresponds to the plurality of fuel passage openings 94 in the guide disk 86. Each of the slots 100 extends tangentially from the respective fuel passage opening 94 to the central aperture 92.*" The slots 100 are shown, for example, in Figures 2a and 2b. Thus, this objection to the drawings should be withdrawn.

Claims 1-9 and 16-23 are rejected under 35 U.S.C.§103(a) as being unpatentable over Wieczorek in view of Daly et al., and U.S. Patent No. 5,979,801 to Munezane et al., ("Munezane").

Insofar as the rejection can be applied to amended claims 1, 3 and 20, Applicants respectfully traverse this rejection because neither Wieczorek, Daly nor Munezane, singularly or in combination, teaches or suggests every element of amended claims 1, 3 or 20.

Claims 1 and 3, as amended, recite a direct injection fuel injector having a cylindrical annulus of a body with an inner diameter that is greater than a diameter of a cylindrical needle. The relationship of these diameters maintains an operative relationship between the body and the needle when the body is exposed to operating temperatures of a cylinder of an engine. Claim 20 as amended, recites a method of stabilizing temperature of a direct fuel injector which is achieved by selecting the body to surround the needle and form a body passage so that fuel in the body passage transfers heat from the body to the needle to maintain a minimum temperature gradient and to maintain an operative relationship between the body and the needle when the

body is exposed to operating temperatures of an engine cylinder. Support for these amendments can be found in the originally filed specification, for example, at page 5.

In contrast, Wieczorek and Daly describe a low pressure non-direct injection fuel injector 10 having a plastic body (as delineated by the cross-hatching of Fig. 1 of either references) and designed, as known to those skilled in the art, to be mounted to an intake manifold instead of being exposed to operating temperatures of a cylinder head of an engine as recited in amended claims 1, 3 and 20.

Notwithstanding the deficiencies in Wieczorek and Daly, Munezane is relied upon for the feature of a seat protruding from a body 9 of a direct injection fuel injector. However, the proposed combination, as asserted, to achieve the claimed invention as a whole of claim 3 is improper because no motivation is provided to select a valve seat of a direct fuel injector of Munezane and incorporate such valve seat in a low pressure non-direct fuel injector of Wieczorek or Daly. That is, there is no teaching or suggestion to use the valve seat of direct injector of Munezane for each of Wieczorek or Daly and any proposed combination of Wieczorek or Daly, to a valve seat of a low-pressure non-direct injection fuel injector. And a substitution of one feature of a first type of fuel injector (the direct injector) for another feature of different type of fuel injector (the low pressure non-direct injection fuel injector) must be suggested, otherwise such a substitution is merely improper picking and choosing of features in various references in an attempt to achieve the claimed invention. Thus, neither Wieczorek, Daly, nor Munezane provides the suggestion to modify Wieczorek and Daly as proposed. Moreover, as applied to claims 1 and 20, Munezane is not applicable as a prior art reference because the subject matter claimed in claims 1 and 20 has a priority date of February 6, 1997 based on Application S.N. 08/795,672, now U.S. Patent No. 5, 875,972. Thus, claims 1, 3 and 21 are patentable over the proposed combination of Wieczorek, Daly and Munezane, singularly or in combination.

Claims 2-5, 11-19 and 21-23 depend ultimately from respective independent claims 1, 3, 10 and 21, are therefore also allowable for at least the same reason as claims 1, 3, 10 and 21, as well for reciting additional features.

CONCLUSION

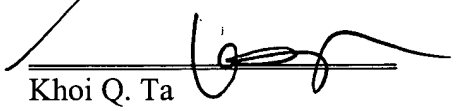
In view of the foregoing amendments and remarks, Applicant respectfully requests the reconsideration and reexamination of this application and allowance of the pending claims 1-5, 10-23. Applicant respectfully invites the Examiner to contact the undersigned at (202) 467- 7203 if there are any outstanding issues that can be resolved via a telephone conference.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached pages are captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE.**"

EXCEPT for issue fees payable under 37 C.F.R. §1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0310. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. §1.136(a)(3).

Respectfully submitted,

MORGAN, LEWIS & BOCKIUS LLP



Khoi Q. Ta
Reg. No. 47,300

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MORGAN, LEWIS & BOCKIUS LLP
1800 M Street, N.W.
Washington, D.C. 20036
(202) 467-7000
Customer No. 009629

VERSION WITH MARKINGS SHOWING CHANGES MADE

IN THE SPECIFICATION:

The paragraph on page 1, starting on line 1 has been amended as follows:

--***Cross-Reference to Related Applications***

This application is a continuation-in-part of U.S. application Serial No. 09/259,168, filed 29 June 1999; which is a continued prosecution application (CPA) of U.S. application Serial No. 09/259,168, filed 26 February 1999, now abandoned; which is a continuation application of U.S. application Serial No. 08/795,672, now U.S. Patent No. 5, 875,972; which is a CPA of U.S. Serial No. 08/795,672, filed 6 February 1997, **now U.S. Patent No. 5,875,972**. This application claims the right of priority to each of the prior applications. Furthermore, each of the prior applications is hereby in their entirety incorporated by reference.--

IN THE CLAIMS:

Claims 6-9 have been canceled.

Claims 1, 3, 10, 16, 19 and 20 have been amended as follows:

1. (Twice Amended) A **direct injection** fuel injector having a fuel inlet, a fuel outlet, and a fuel passageway extending from the fuel inlet to the fuel outlet along a longitudinal axis, the fuel injector comprising:

a body having an inlet portion, an outlet portion, a neck portion disposed between the inlet portion and the outlet portion, the neck portion including a cylindrical annulus that provides a body passage extending from the inlet portion to the outlet portion along the longitudinal axis of the fuel injector;

an armature proximate the inlet portion of the body;

a cylindrical needle operatively connected to the armature;

a seat protruding from the outlet portion of the body; and

a swirl generator proximate the seat;

wherein the cylindrical annulus of the body includes an inner diameter that is greater than a diameter of the cylindrical needle so as to define the body passage, which maintains an operative relationship between the body and the needle **when the body is exposed to operating temperatures of a cylinder of an engine.**

3. (Twice Amended) A **direct injection fuel injector having a fuel inlet, a fuel outlet, and a fuel passageway extending from the fuel inlet to the fuel outlet along a longitudinal axis, the fuel injector comprising:**

a body having an inlet portion, an outlet portion, a neck portion disposed between the inlet portion and the outlet portion, the neck portion including a cylindrical annulus that provides a body passage extending from the inlet portion to the outlet portion along the longitudinal axis of the fuel injector;

an armature proximate the inlet portion of the body;

a cylindrical needle operatively connected to the armature;

a seat protruding from the outlet portion of the body; and

a swirl generator proximate the seat;

wherein the cylindrical annulus of the body includes an inner diameter that is greater than a diameter of the cylindrical needle so as to define the body passage, which maintains an operative relationship between the body and the needle when the body is exposed to operating temperatures of a cylinder of an engine, and ~~[The fuel injector of claim 1,]~~ wherein the seat ~~[comprises]~~ **includes** a first surface exposed to the fuel passageway and a second surface exposed to an exterior of the fuel injector, the first surface being spaced from the second surface a defined distance along the longitudinal axis, the first surface having at least one cut-out configuration that extends for a fraction of the defined distance into an interior of seat.

10. (Amended) ~~[The fuel injector according to claim 9, wherein]~~ **A fuel injector having a fuel inlet, a fuel outlet, and a fuel passageway extending from the fuel inlet to the fuel outlet along a longitudinal axis, the fuel injector comprising:**

a body having an inlet portion, an outlet portion, and a body passage extending from the inlet portion to the outlet portion along the longitudinal axis;

an armature proximate the inlet portion of the body;

a needle operatively connected to the armature, the needle includes a curved surface that engages with a conical end of the funnel to inhibit fuel flow through the seat passage of the seat;

a swirl generator proximate the needle, the swirl generator comprises at least one flat disk, the at least one flat disk ~~[comprises]~~ **includes**:

a guide disk having a perimeter, a central aperture, and at least one fuel passage opening between the perimeter and the central aperture; and

a swirl disk having at least one slot extending tangentially from the at least one fuel passage opening to the central aperture**;**

a seat protruding from the outlet portion of said body, the seat including a first surface exposed to the body passage and a second surface exposed to an exterior of the fuel injector, the first surface being spaced from the second surface a defined distance along the longitudinal axis, the first portion having at least one cut-out configuration that extends from the first surface for a fraction of the defined distance into an interior of seat wherein the at least one cut-out comprises at least one volume that defines at least one wall in the interior of the seat, the at least one volume comprises one of a plurality of volumes and a channel, wherein the seat includes a seat passage, the seat passage including a funnel extending between the first surface and the second surface.

16. (Amended) The fuel injector of claim ~~[8]~~ **10**, wherein the channel comprises a width on the first surface, and wherein each of the plurality of fuel passage openings comprises a circular aperture with a diameter, the diameter of one of the fuel passage openings being substantially equal to the width of the channel.

19. (Amended) The fuel injector of claim ~~[8]~~ **10**, wherein the body comprises a neck portion, the neck portion including a cylindrical annulus that surrounds the needle, the needle being a substantially cylindrical needle; and

wherein the cylindrical annulus comprises an inner diameter and an outer diameter, the inner diameter that is no more than 50% greater than a diameter of the cylindrical needle, and an outer diameter that is no less than 100% greater than the inner diameter.

20. (Twice Amended) A method of stabilizing temperature of a **direct injection** fuel injector ~~[in a direct injection application]~~, the fuel injector having a body; an armature proximate an inlet of the body; a needle operatively connected to the armature; a seat disposed at the outlet of the body; and a swirl generator proximate the seat, the method comprising:

providing the needle with a substantially uniform cross-sectional area; and

selecting the body to surround the needle and form a body passage, the body passage maintains an operative relationship between the body and the needle **so that**~~[;wherein]~~ fuel in the body passage transfers heat from the body to the needle to maintain a minimum temperature gradient and to maintain an operative relationship between the body and the needle **when the body is exposed to operating temperatures of an engine cylinder**.